

PBEEEP

State Government

Public Buildings Enhanced Energy Efficiency Program

SCREENING RESULTS FOR ADMINISTRATION BUILDING



June 9, 2011

Summary Table

Administration Building	
Location	50 Sherburne Ave, Saint Paul, MN 55101
Facility Manager	Gordon Specht
Number of Buildings	1
Interior Square Footage	80,144
PBEEEP Provider	Center for Energy and Environment (Gustav Brändström)
State's Project Manager	Harvey Jaeger
Date Visited	January 11, 2011
Annual Energy Cost (from B3)	\$122,891 (2010)
Utility Company	District Energy St. Paul (Hot and Chilled Water), Xcel Energy (Natural Gas and Electricity)
Site Energy Use Index (from B3)	77.5 kBtu/sq ft (2010)
Benchmark EUI (from B3)	94.2 kBtu/sq ft

The Administration Building is a four story building built in 1969. It houses business the management, administrative, and professional services for the State of Minnesota. There is a floor plan of the building at the end of this report.

Screening Overview

The goal of screening is to select buildings where an in-depth energy investigation can be performed to identify energy savings opportunities that will generate savings with a relatively short (1 to 5 years) and certain payback. The screening of the Administration Building was performed by the Center for Energy and Environment (CEE) with the assistance of the facility staff. A walk-through was conducted on January 11, 2011 and interviews with the facility staff were carried out to fully explore the status of the energy consuming equipment and their potential for recommissioning. This report is the result of that information.

Recommendation

A detailed investigation of the energy usage and energy savings opportunities of the Administration Building is not recommended at this time. The floor area listed in the table has not been verified.

Building Name	State ID	Square Footage	Year Built
Administration Building	G02310162	80,144	1969

There are many factors that are part of the decision to recommend an energy investigation of a building; at the Administration Building some of the characteristics that would indicate the facility is a good potential candidate for recommissioning are:

- Large square footage
- Level of control by the building automation system
- Equipment size and quantity
- Support from the staff and management to include building in an investigation

Although the building staff are clearly supportive of an energy investigation and would like to further reduce energy use at their facility, the energy use at the site is simply too low for a recommissioning study to be certain of delivering cost-effective savings. Recommissioning is focused on low-cost and no-cost measures that typically involve control changes and other minor adjustments to equipment operation. The Energy Use Index (EUI) for the Administration Building has dropped by 23% in the last three years and is currently 77.5 kBtu/sq ft. This is a lower than average EUI and indicates that the staff has already identified the majority of short payback items. In addition, the staff has already implemented many good ideas, and continues to pursue others to reduce their energy consumption.

Potential Energy Reduction Measures and Existing Problems

Although the building is not a good candidate for an energy investigation, there were some potential measures and existing problems identified during the screening that may result in energy savings if resolved. The building staff is aware of these issues and they are listed below:

- The outside air temperature sensor for the building BAS seems to be out of calibration. The weather station in St Paul says it was 37°F outside while the BAS says 31°F. This difference really makes a difference when it comes to heating and cooling lockouts, and for economizer operation.

Mechanical Equipment

There is only one air handler in the building. It is a VAV AHU which serves 122 VAV boxes throughout the space. The air handler uses hot water, chilled water, and humidification to condition the air. The supply fan is located on the ground floor and the return fan is located in the penthouse. There is radiation around the entire perimeter for overnight heat.

The heating and cooling of the building is supplied by District Energy and the heating water is isolated from the Capitol Campus loop by heat exchangers. The Plant Management Department regulates when hot water and chilled water is available to the buildings on the Capitol Campus.

There are three large exhaust fans in the building. The garage and main building exhaust fans are not scheduled to run on a daily basis, only the bathroom fan is run continuously.

The following table lists the key mechanical equipment in the Administration Building.

Mechanical Equipment Summary Table	
Quantity	Equipment Description
1	Honeywell EBI Automation System
1	Building
80,144	Interior Square Feet
1	Air Handler
122	VAV Boxes (81 new, 41 old VAVs)
6	Hot Water Pumps
2	Chilled Water Pumps
1	CRAC Units
3	Exhaust Fans
1,450	Approximate number of points available to be trended

Controls and Trending

The building runs on a Honeywell EBI R310.1 Building Automation System (BAS), which is part of the State Capitol Complex system. The Plant Management Division (PMD) of the Department of Administration controls the BAS.

Lighting

The majority of interior lighting is 32 Watt T8s, but individual bulbs are being replaced with 25W bulbs as the older ones burn out. Most spaces are switched by manual switches but conference rooms have occupancy sensors.

Energy Use Index and B3 Benchmark

The site Energy Use Index (EUI) is 77.5 kBtu/sq ft. This is 18% lower than the B3 Benchmark of 94.2 kBtu/sqft. The median site EUI for State of Minnesota buildings are 23% lower than their corresponding B3 Benchmarks. This indicates that the Administration Building only has a small potential to further reduce its energy use relative to other State buildings.

Metering

The Administration Building has one electric, one hot water, and one chilled water meter. The district energy meters are used by Plant Management to bill for the HW and CHW use in the building.

Documentation

There is a significant amount of mechanical documentation, including building plans, equipment schedules, operations and maintenance manuals, and control sequences available on-site.

Building Summary Table

The following tables are based on information gathered from interviews with facility staff, a building walk-through, automation system screen-captures, and equipment documentation. The purpose of the tables is to provide the size and quantity of equipment and the level of control present in each building. It is complete and accurate to the best of our knowledge.

Administration Bldg State ID# G0231010162					
Area (sqft)	80,144	Year Built	1969	EUI/Benchmark	77.5 / 94.2
HVAC Equipment					
Air Handlers (7 Total)					
Description	Type	Size	Notes		
S-1	VAV AHU	SF: 50hp RF: 15hp	Has 60kW Humidifier.		
Hot Water System					
Description	Type	Size	Notes		
Rh P 1&2	Pump	3hp, 120 gpm	Serves Reheats and AHU		
Rad P 1&2	Pump	3hp, 74 gpm	Serves North Side of Building		
Rad P 3&4	Pump	2hp, 66 gpm	Serves South Side of Building		
HX1	Heat Exchanger	2,004 kBtu/h	Serves HW Reheat System		
HX 2	Heat Exchanger	1,474 kBtu/h	Serves HW Radiation System		
Chilled Water System					
Description	Type	Size	Notes		
CHWP 1&2	Pump	10hp, 330 gpm	Serves only S-1		
VAV Boxes (122 Total)					
Description	Type	Size	Notes		
Old VAVs	VAV Box with Reheat	130 cfm to 2,780 cfm	41 Units. 31 on 1 st Floor, 10 on 3 rd Floor.		
VAV G1-22	VAV Box with Reheat	70 cfm-to 2600cfm	22 Units on Ground Floor		
VAV 1-32 to 37	VAV Box with Reheat	380cfm-to 820cfm	6 Units on 1 st Floor		
VAV 2-1 to 35	VAV Box with Reheat	50cfm-to 1350cfm	35 Units on 2 nd Floor		
VAV 3-11 to28	VAV Box with Reheat	130cfm to 860 cfm	18 Units on 3 rd Floor		
Exhaust Fans (3 Total)					
Description	Type	Size	Notes		
Ramp Exhaust	Exhaust Fan	Unknown	Does not run		
Toilet Exhaust	Exhaust Fan	Unknown			
General Exhaust	Exhaust Fan	Unknown	Does not run		

Points on BAS**Air Handlers**

Description	Points
S1	OAT, OARH, Relief CFM, Relief Damper, Relief Damper, RAT, RF Speed, RARH and Setpoint, RA Damper, OA Damper Pos, Min OA Damper Setpoint, OA CFM, MAT and Setpoint, Cooling Valve Pos, SF-S and Speed, DAT and Setpoint, DSP and Setpoint, Humidifier Output, Morning Warmup Status and Setpoint, Economizer Status and Lockout Temp, 1 st Floor and Ground Floor Space Static Pressure

VAV Boxes with Reheat

Description	Points
VAV	Flow and Setpoint, Damper Pos, DAT, Heating Valve Pos, Room Temp and Setpoint, Occ Heating Setpoint, UnOcc Heating Setpoint, Occ Cooling Setpoint, UnOcc Cooling Setpoint

Chilled Water System

Description	Points
Chilled Water Loop	Capitol Loop: CHWST, CHWRT and Setpoint, Valve Pos Building Loop: CHWP Status and Speed (2X), CHWP By-Pass Valve Pos, CHWST, CHWRT, DP and Setpoint, OA Valve Enable Setpoint, OA Pump Enable Setpoint, Min Pump Speed

Reheat System

Description	Points
HW Reheat Loop	Capitol Loop: HWRT and Setpoint, Valve Pos Building Loop: HWST and Setpoint, HWRT, RhP 1&2 Status and Speed, HW Loop DP and Setpoint, System Enable Setpoint, HWST Reset Schedule

Radiation System

Description	Points
HW Radiation Loop	Capitol Loop: HWST, HWRT and Setpoint, Valve Pos Building Loop: HWST and Setpoint, HWP 1&2 Status, HWP 3&4 Status, North HW Return Valve Pos, South HW Return Valve Pos, North Space Temp, South Space Temp, System Enable Status, HWST Reset Schedule

Misc

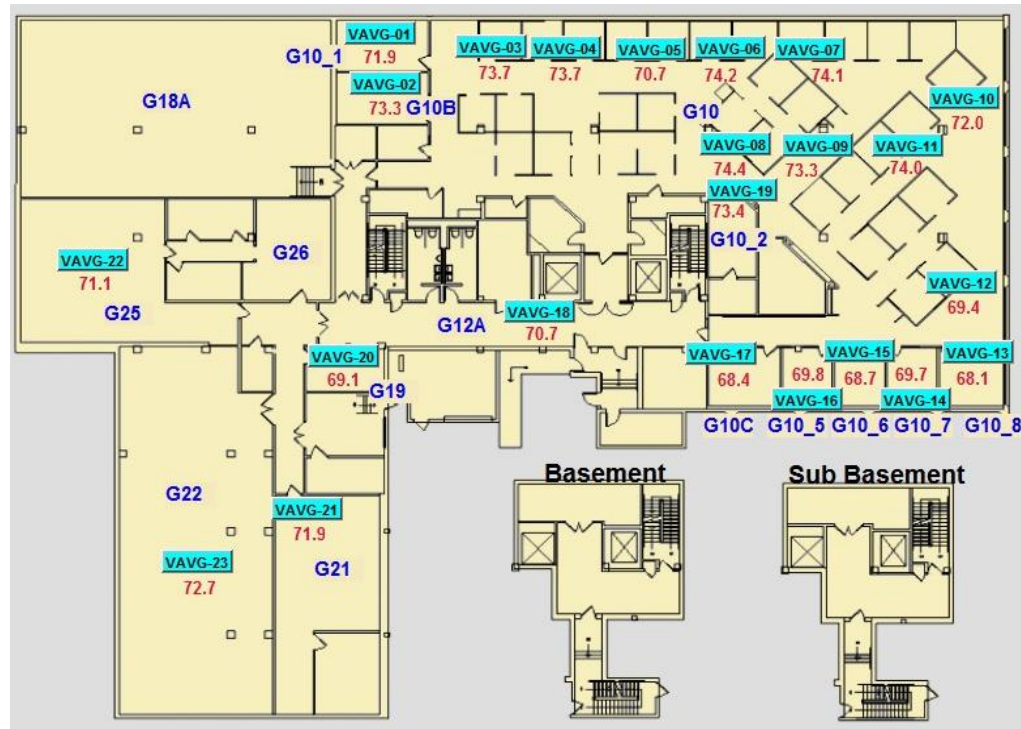
Description	Points
Humidifier Boiler	Status
Compressor	Status
Room Temps	Rm G10, Rm G21/26, Rm G21, Ground Floor Hallway, and Loading Dock Temps

Exhaust Fans

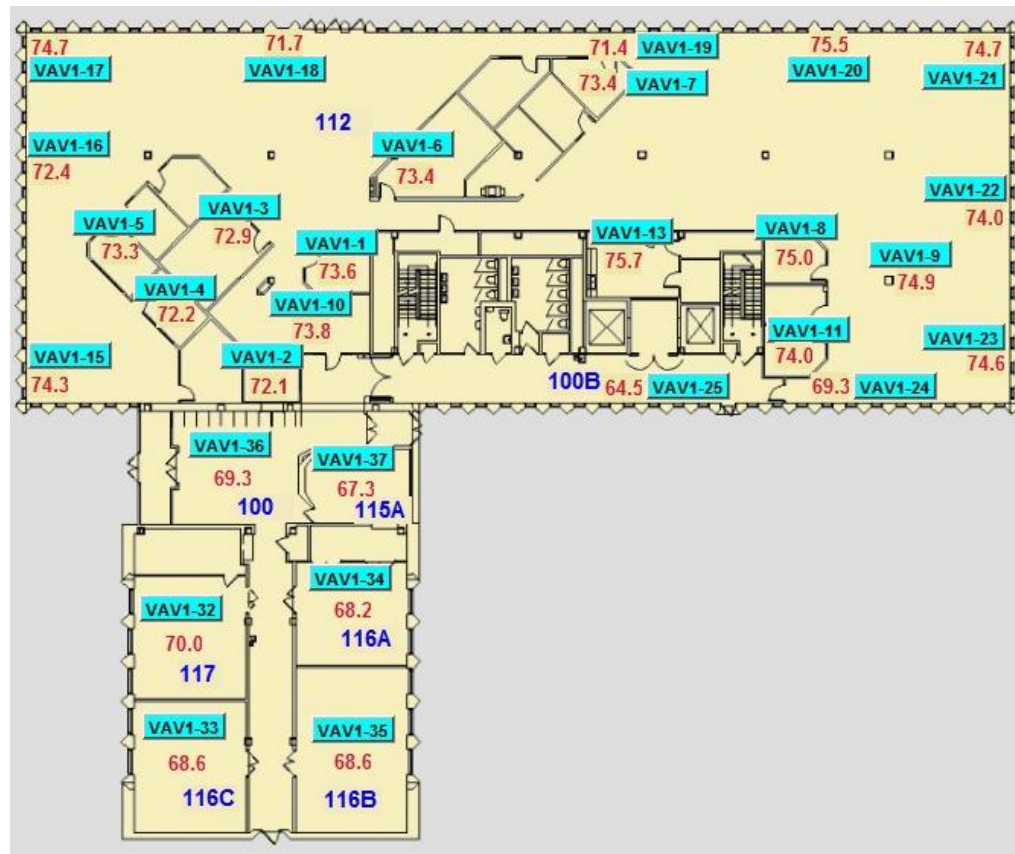
Description	Points
Ramp EF	Status
Toilet EF	Status
General EF	Status

Floor Plans

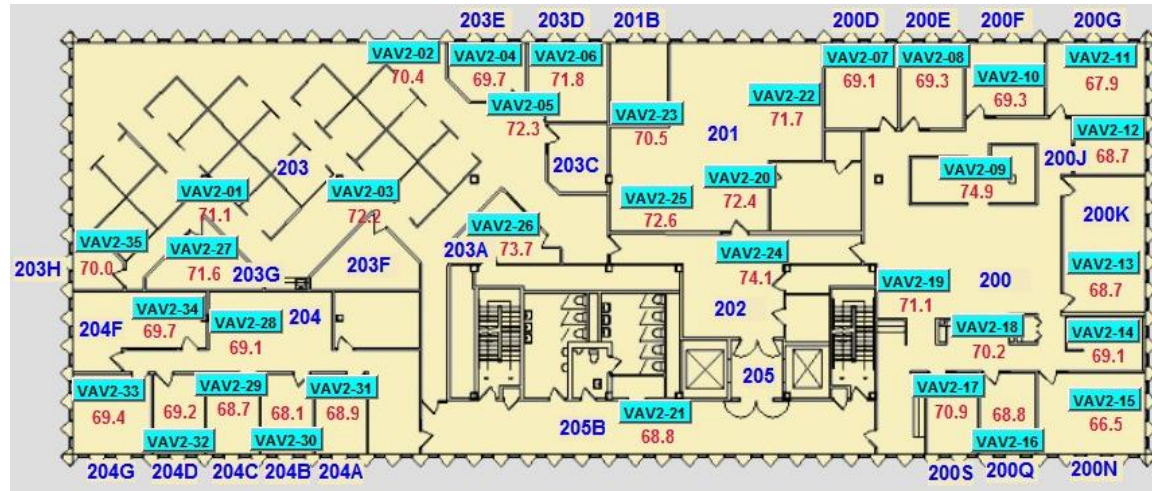
Ground floor and Basements



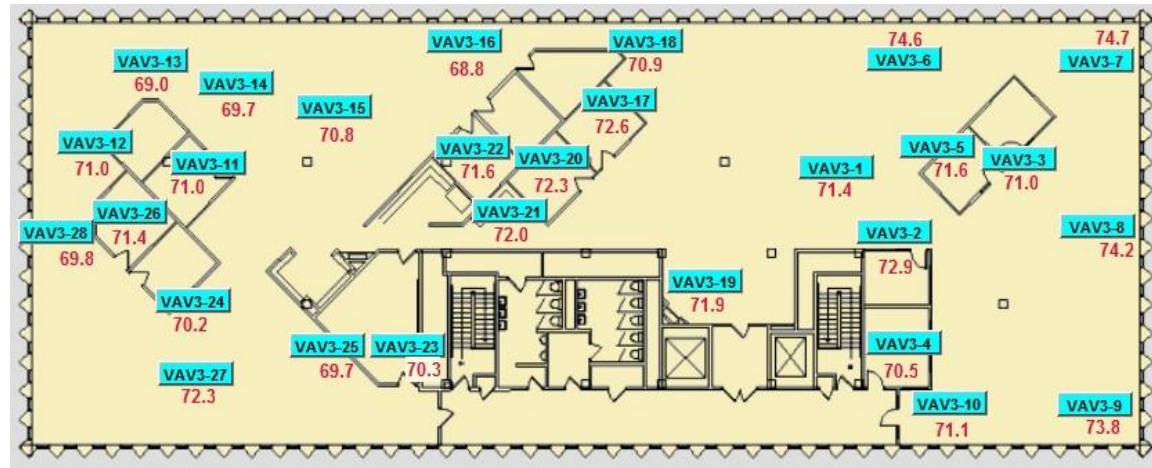
First Floor



2nd Floor



3rd Floor



PBEEP Abbreviation Descriptions			
AHU	Air Handling Unit	hp	Horsepower
BAS	Building Automation System	HRU	Heat Recovery Unit
CD	Cold Deck	HW	Hot Water
CDW	Condenser Water	HWDP	Hot Water Differential Pressure
CDWRT	Condenser Water Return Temperature	HWP	Hot Water Pump
CDWST	Condenser Water Supply Temperature	HWRT	Hot Water Return Temperature
cfm	Cubic Feet per Minute	HWST	Hot Water Supply Temperature
CHW	Chilled Water	HX	Heat Exchanger
CHWRT	Chilled Water Return Temperature	kW	Kilowatt
CHWDP	Chilled Water Differential Pressure	kWh	Kilowatt-hour
CHWP	Chilled Water Pump	MA	Mixed Air
CHWST	Chilled Water Supply Temperature	MA Enth	Mixed Air Enthalpy
CRAC	Computer Room Air Conditioner	MARH	Mixed Air Relative Humidity
CV	Constant Volume	MAT	Mixed Air Temperature
DA	Discharge Air	MAU	Make-up Air Unit
DA Enth	Discharge Air Enthalpy	OA	Outside Air
DARH	Discharge Air Relative Humidity	OA Enth	Outside Air Enthalpy
DAT	Discharge Air Temperature	OARH	Outside Air Relative Humidity
DDC	Direct Digital Control	OAT	Outside Air Temperature
DP	Differential Pressure	Occ	Occupied
DSP	Duct Static Pressure	PTAC	Packaged Terminal Air Conditioner
DX	Direct Expansion	RA	Return Air
EA	Exhaust Air	RA Enth	Return Air Enthalpy
EAT	Exhaust Air Temperature	RARH	Return Air Relative Humidity
Econ	Economizer	RAT	Return Air Temperature
EF	Exhaust Fan	RF	Return Fan
Enth	Enthalpy	RH	Relative Humidity
ERU	Energy Recovery Unit	RTU	Rooftop Unit
FCU	Fan Coil Unit	SF	Supply Fan
FPVAV	Fan Powered VAV	Unocc	Unoccupied
FTR	Fin Tube Radiation	VAV	Variable Air Volume
GPM	Gallons per Minute	VFD	Variable Frequency Drive
HD	Hot Deck	VIGV	Variable Inlet Guide Vanes

Conversions
1 kWh = 3.412 kBtu
1 Therm = 100 kBtu
1 kBtu/hr = 1 MBH